No. 724,501. PATENTED APR. 7, 1903.

J. W. RENO.

HYDRAULIC DREDGE.

APPLICATION FILED JAN. 2, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

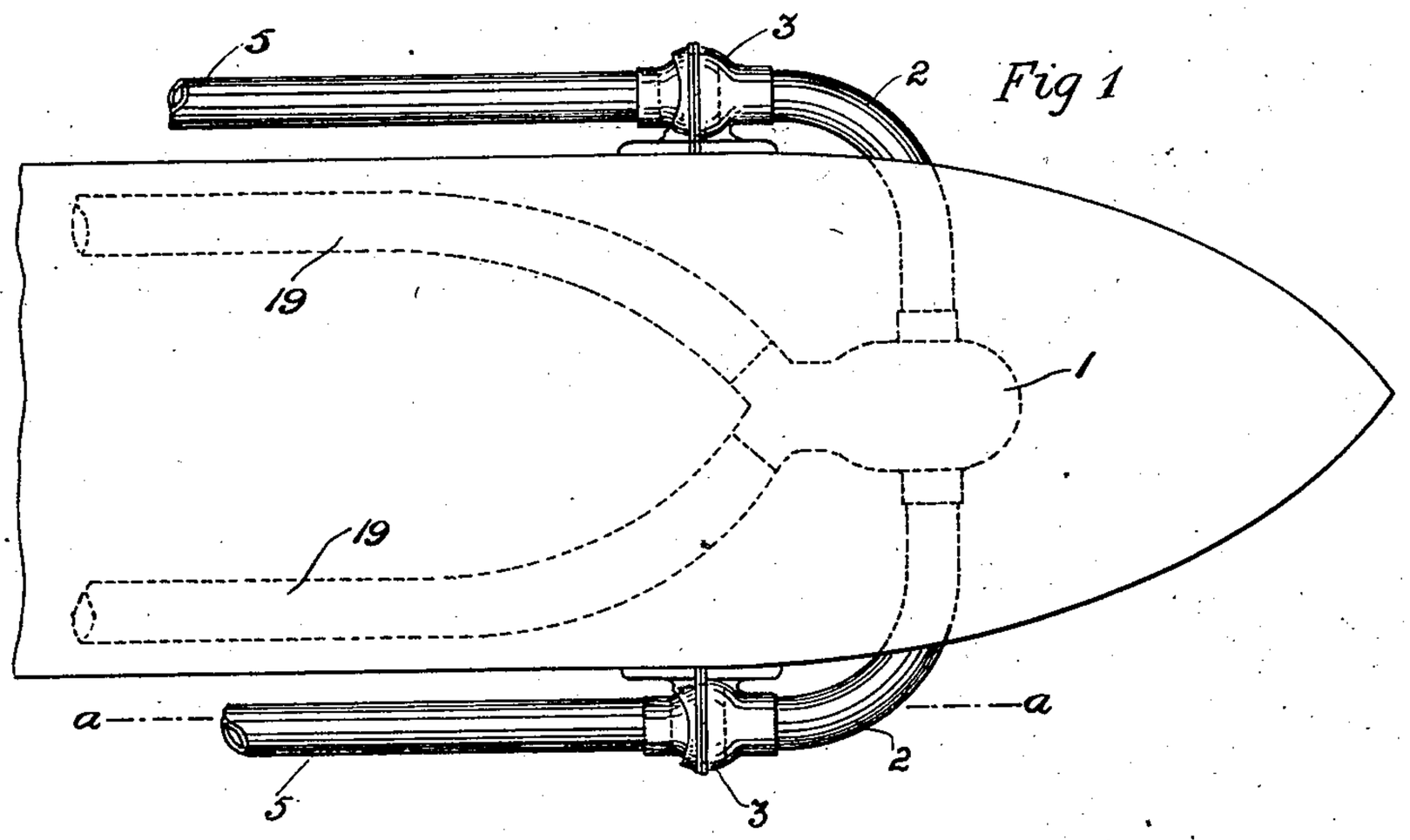

Fig 1

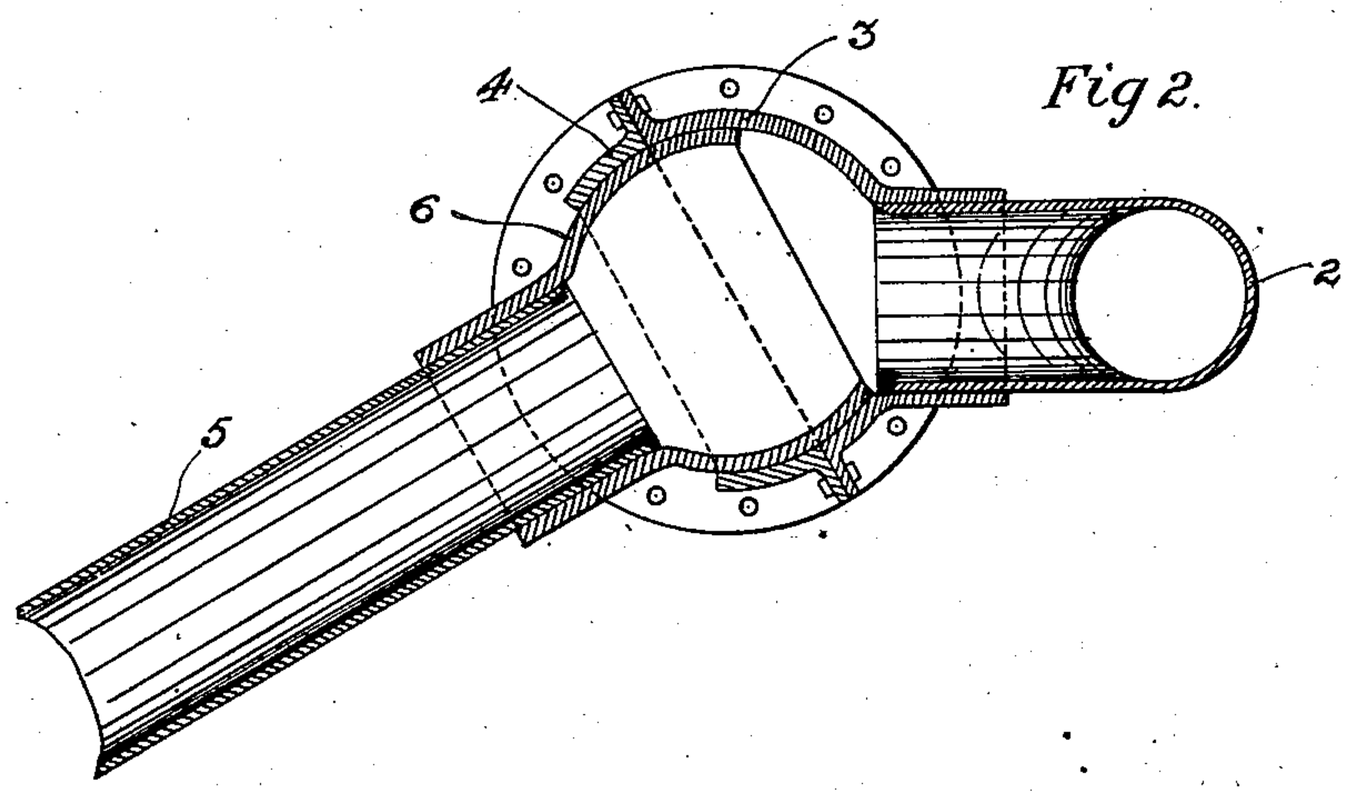

Fig 2.

WITNESSES:

Ella Finch

Maurice A Carst.

INVENTOR

Jesse W. Reno.

BY

Chas J Edell

ATTORNEY

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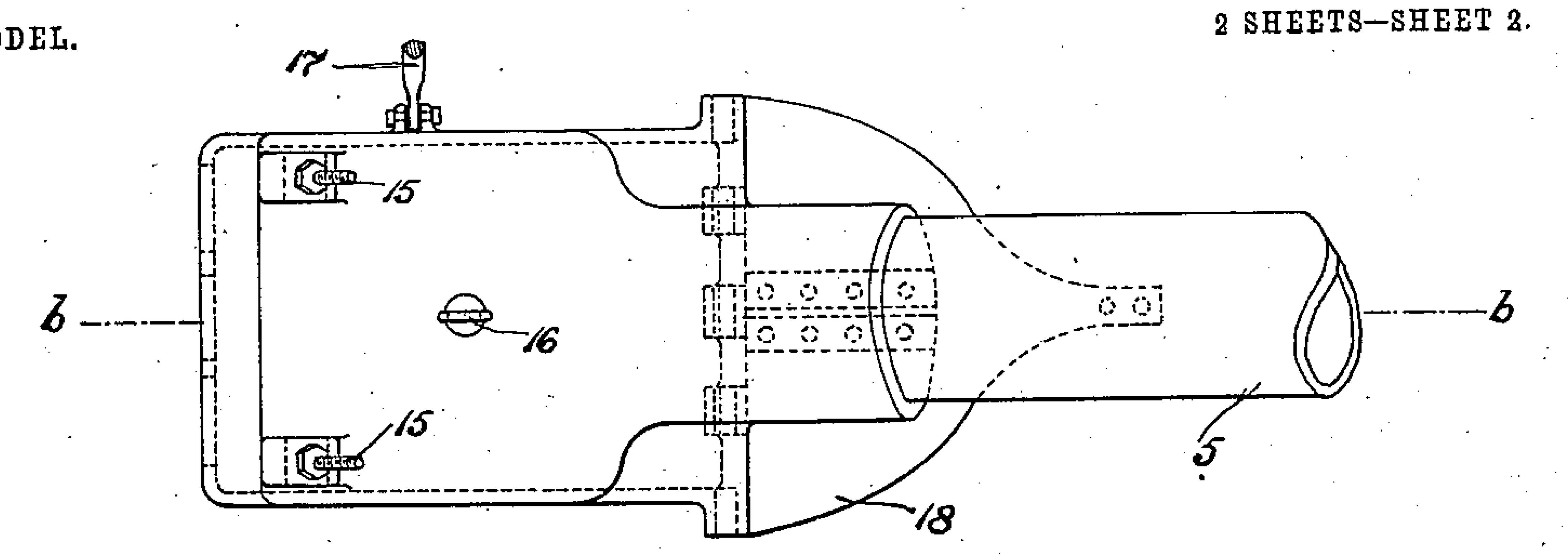

Fig 3

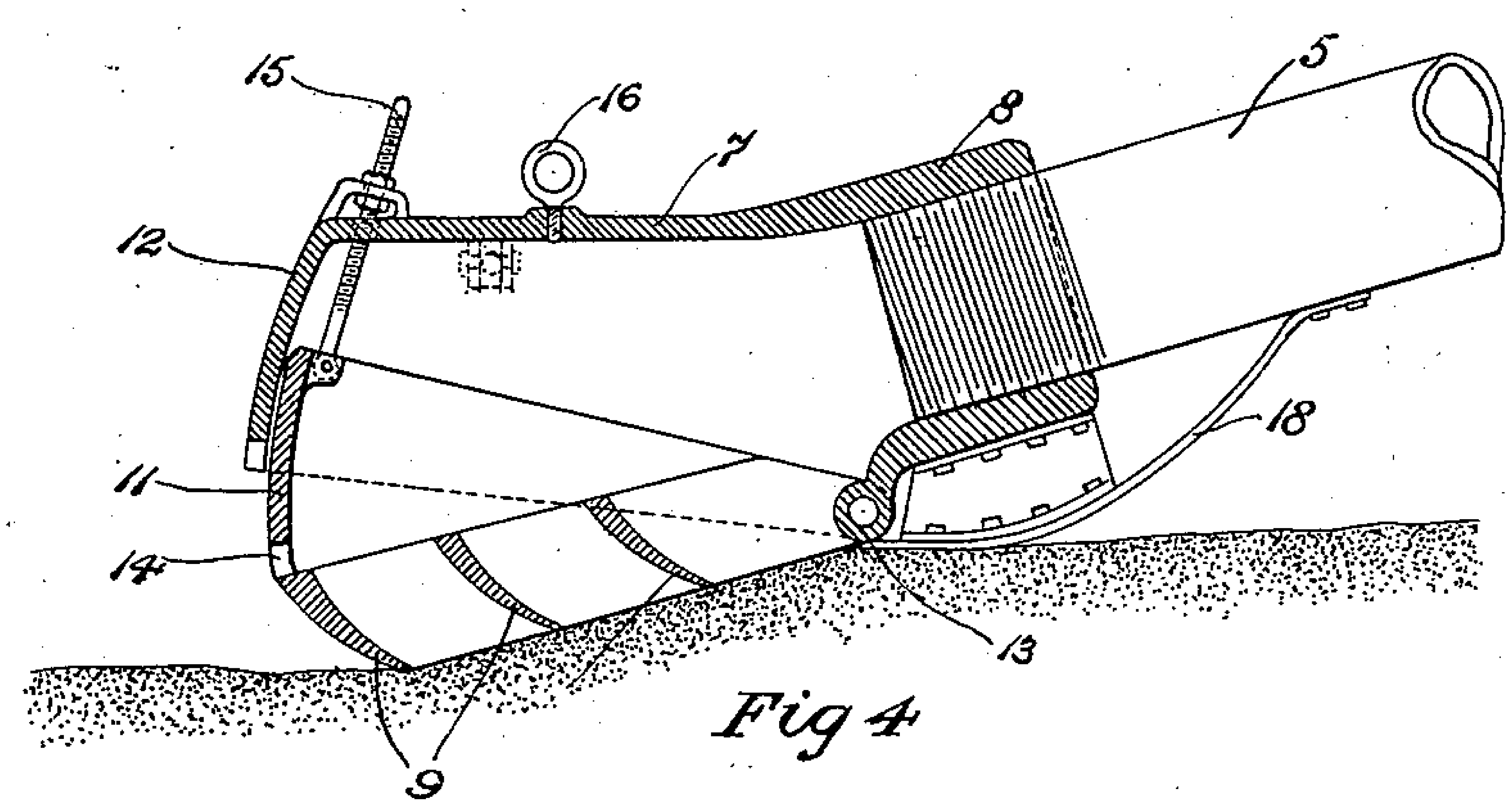

Fig 4

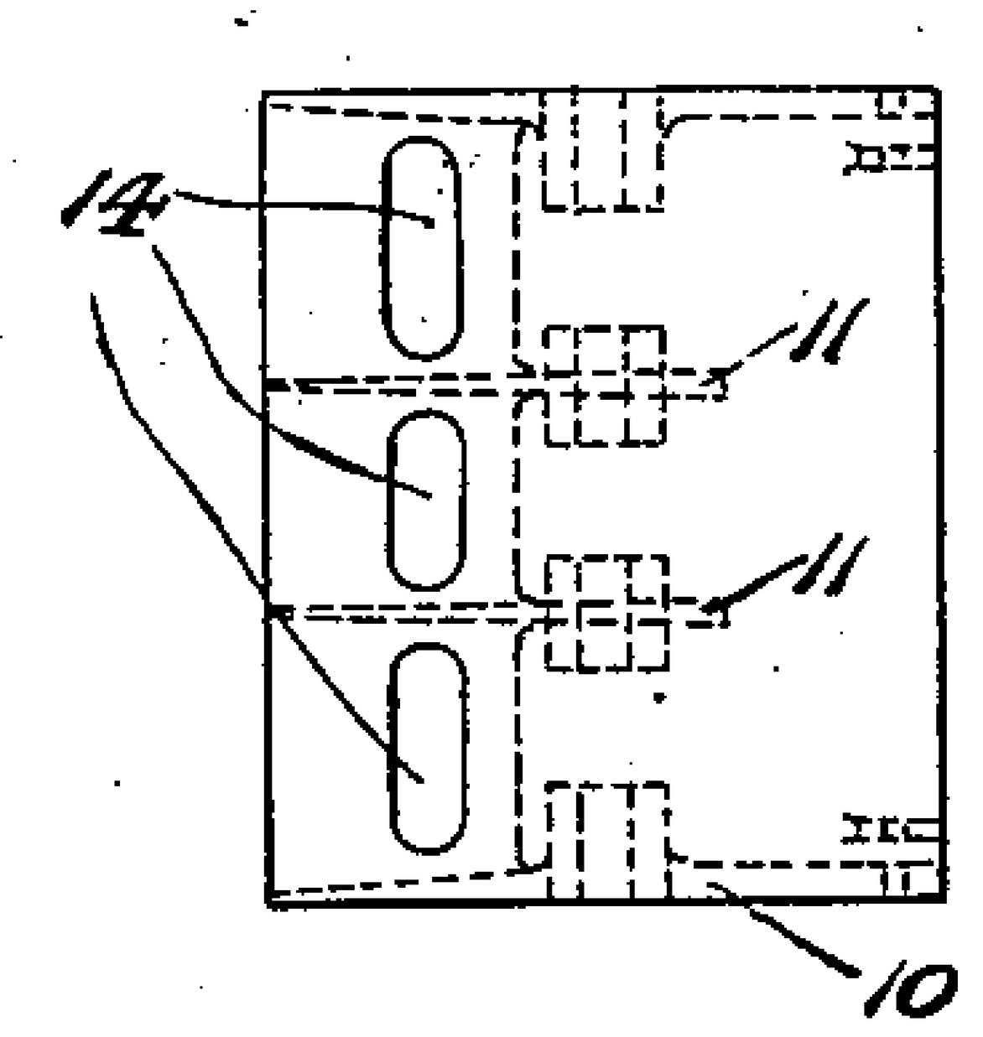

Fig 6

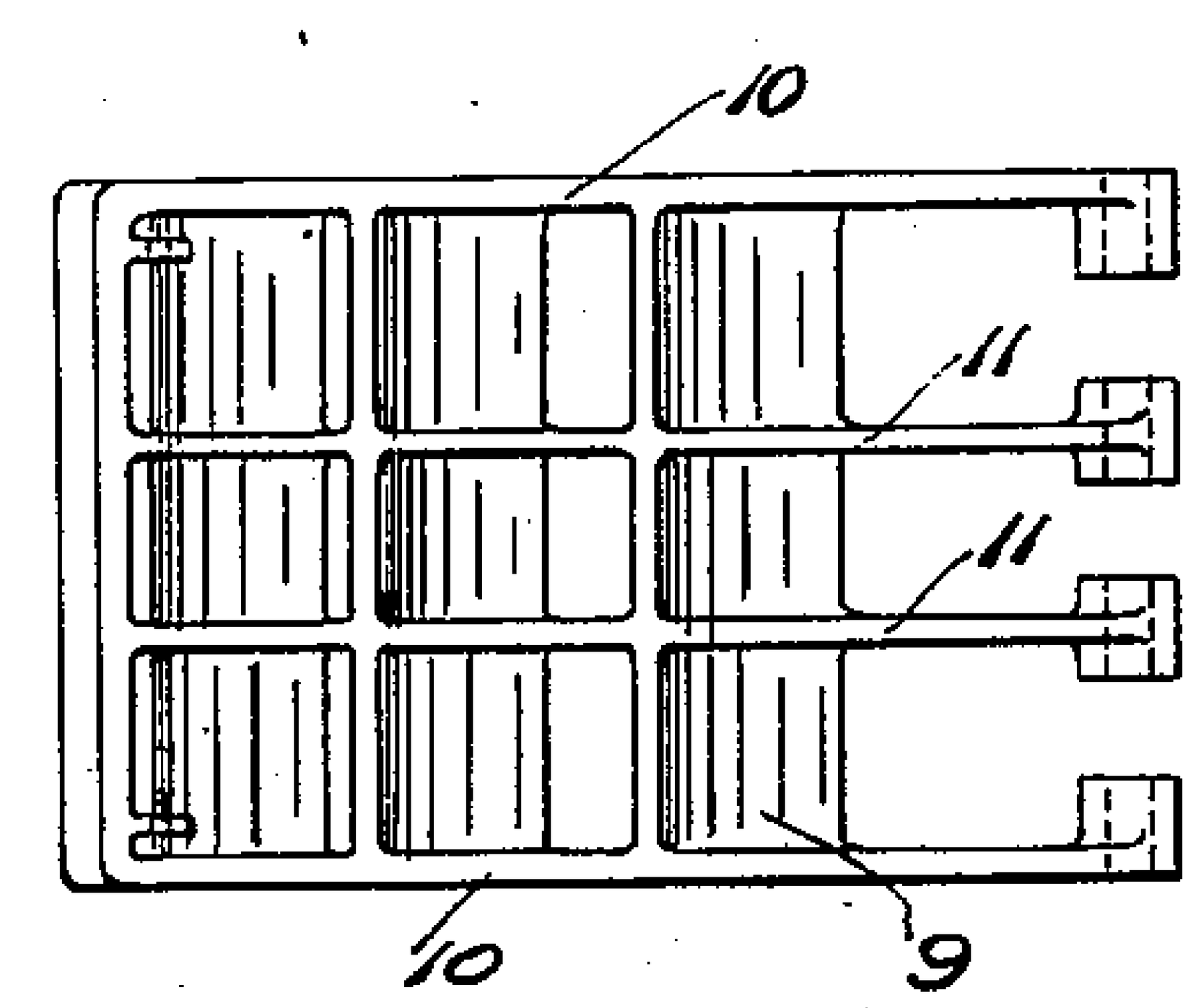

Fig 5

WITNESSES:

Ella Finck

J. Maurice Hearst

INVENTOR

Jesse W. Reno.

BY Chas. J. Earle

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JESSE W. RENO, OF NEW YORK, N. Y.

HYDRAULIC DREDGE.

SPECIFICATION forming part of Letters Patent No. 724,501, dated April 7, 1903.

Application filed January 2, 1903. Serial No. 137,404. (No model.)

To all whom it may concern:

Be it known that I, JESSE W. RENO, a citizen of the United States of America, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Hydraulic Dredges, of which the following is a specification.

My invention relates to improvements in hydraulic dredges, and more particularly to that class of dredges where a pump and suction-pipe are employed to convey loose material from the beds of navigable waters—such as harbors, rivers, and canals—to suitable receptacles.

The object of my invention is to provide a dredge of this class which shall be simple and effective in its construction and operation, one that will permit considerable motion of the vessel on which the dredge is carried without causing injury thereto, and also to provide improved means for the drag or scraper at the lower end of the suction-pipe.

My invention consists in providing a suitable vessel of any kind adapted for the purpose with a pump, preferably a rotary pump of large capacity, in connecting to the suction end of the pump a pipe which shall extend to a point outside of the vessel, and in connecting to this pipe by means of a universal-joint connection another pipe of sufficient length to reach in an inclined direction to the bottom to be dredged.

My invention consists, further, in providing an improved drag or scraper for the lower end of the inclined pipe, which will be fully hereinafter explained.

In carrying out my invention I employ the well-known principles of carrying the excavated material from the point where the dredging proper takes place to the place of delivery by means of a stream of water.

My apparatus may be installed on any vessel which is provided with suitable means for propulsion and power to operate a pump. The pump may be of any improved pattern. I prefer to have some form of rotary pump which is designed for a large capacity and a comparatively small head. To the suction end of the pipe is connected a suction-pipe which leads to the exterior of the vessel. The outer end of the suction-pipe is connected with a hollow spherical bracket. Extending from this bracket downward in an inclined direction is a movable suction-pipe which has formed upon or secured to its upper end a spherical enlargement adapted to fit within the spherical bracket in such a way as to permit the movable pipe to move in all directions about the spherical bracket in the center. To the lower end of the movable pipe is secured a hollow box-shaped drag provided with adjustable blades or scrapers and provided with openings for the ingress of water just above the scrapers, so that as the material is loosened and forced up upon the blades it is immediately brought in contact with a current of water.

In the drawings accompanying and forming part of this specification, Figure 1 is a partial plan view of a boat equipped with my improved dredging apparatus. Fig. 2 is a section on line *a a* of Fig. 1. Fig. 3 is a plan view of the lower end of the movable pipe and the drag or scraper to which it is connected. Fig. 4 is a section on line *b b* of Fig. 3. Figs. 5 and 6 are plan and rear views, respectively, of the scraper-blades.

The reference characters are used in the same sense in all of the drawings and the specification.

Numeral 1 represents a pump of any improved construction located, preferably, in the fore end of the boat.

2 represents the suction-pipes connected with the pump and leading therefrom to the exterior of the boat and being joined at their outer ends to the spherical brackets 3. The spherical brackets 3 are provided with the annular rings 4, whose inner surfaces are continuous with the inner spherical surfaces of the brackets 3.

5 represents the outer or movable pipe, secured to the upper end of which is the spherical enlargement 6, adapted to fit within the spherical bracket 3. This construction, it will be seen, is a kind of universal-joint connection, which permits the movable pipe 5 to move to a limited extent in any direction about the center of the bracket 3. Secured to the lower end of the movable pipe 5 is a drag-case 7, which has the general shape of a rectangular box provided with a boss 8 to receive the end of the pipe 5, the lower side being open.

9 represents the cutter-blades of the drag, which are preferably made in one casting having the outside flanges 10 and the intermediate ribs, the purpose of the intermediate ribs being not only to strengthen the blades, but to prevent the entrance of pieces of too great size. Formed integrally with the scraper-blades 9 is a curved back 11, which is made to fit loosely inside of the back 12 of the box 7, the scraper-blades being pivoted to the box 7 by means of a shaft 13.

14 represents apertures or openings in the back 11, arranged just above the blades 9.

15 represents a bolt secured to the back 11 and provided with a screw-thread, by means of which the position of the scraper-blades is adjusted.

16 represents an eye on the box or case 7 for the purpose of attaching a cable with which to raise and lower the drag.

17 represents a connecting-rod employed where two or more drags are used for the purpose of keeping them a fixed distance apart.

18 represents a shoe secured to the lower front side of the drag and the pipe 5, the purpose of which is to strengthen the connection between the pipe and the drag and also to form a shoe which shall readily ride over obstacles, such as sunken driftwood and the like.

19 represents delivery-pipes leading from the pump to any suitable receptacles, which may be either on the same boat as the dredge or on scows or auxiliary boats.

It will be obvious that by means of my universal-joint connection between the movable and fixed suction-pipes the connection between these two pipes will be relieved of all undue strain due to the motion of the boat, and it will be seen that as the material is loosened and scraped up by the blades 9 it is directly brought in contact with a current of water coming in through the openings 14, whence it will be carried up through the pipes 5 and 2 and delivered to the pipes 19. It is also obvious that the inclination of the movable pipe will vary according to the depth of water above the bottom to be dredged. The pivotal connection between the scraper-blades and the drag-case 7 makes it possible to adjust the angle of the cutter-blades as may be desired for varying depths. Another advantage of this construction of the cutter-blades is that when worn out or damaged they may be easily replaced.

Having thus described my invention, what I claim is—

1. In a dredge, the combination with a vessel, of a pump upon said vessel, a suction-pipe connected to said pump, a movable pipe exterior to said vessel adapted to lead downward in an inclined direction, and a universal-joint connection connecting said movable pipe with said suction-pipe.

2. In a dredge, the combination with a pump, a suction-pipe connected to said pump, a hollow spherical bracket secured to the end of said suction-pipe, and a movable pipe having a hollow spherical end adapted to fit within said spherical bracket.

3. In a hydraulic dredge, the combination with a movable suction-pipe, of a drag secured to its lower end, said drag having a plurality of scraper-blades secured to longitudinal webs in pivotal connection with said drag, and means for adjusting said scraper-blades relative to said drag.

4. In a dredge, the combination with a movable suction-pipe, of a box-shaped case secured to the lower end of said pipe, and scraper-blades in pivotal connection with said box-shaped case.

5. In a dredge, the combination with a movable suction-pipe, of a box-shaped case secured to the lower end of said suction-pipe, having its lower side open, transverse scrapers located in the lower open side of said box, and openings at the rear of said blades for the ingress of water, substantially in line with the tops of said blades.

6. In a dredge, the combination with a pump and a stationary suction-pipe, of an external movable suction-pipe, a universal joint connecting said movable and said fixed suction-pipes, and a drag provided with scraper-blades attached to the lower end of said movable pipe.

7. In a dredge, the combination with a movable suction-pipe, of a hollow box-shaped case secured to the lower end of said suction-pipe, said case having pivoted at its front lower side a series of scraper-blades, longitudinal webs to strengthen said scraper-blades, and an extended transverse web at the rear of said scraper-blades having apertures therein for the ingress of water.

8. In a dredge, the combination with a movable suction-pipe, of a hollow case secured to the lower end of said suction-pipe, scraper-blades secured together by longitudinal webs in pivotal connection with the front lower portion of said case, a curved back for said case concentric with said pivotal connection, a curved extension extending upward from the rear scraper-blade, and apertures for the ingress of water in said curved extension.

9. In a dredge, the combination with a movable suction-pipe, of a case secured to the lower end of said suction-pipe, having its lower side open, a scraper-blade mounted on a pivotal connection in the lower open side of said case, and means for adjusting said scraper-blade.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JESSE W. RENO.

Witnesses:

HARRY S. BANDLER,

ELLA TUCH.